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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,819	05/14/2007	Elke Zakel	7751P005	7190
7590 12/10/2008 Blakely Sokoloff Taylor & Zafman 7th Floor 12400 Wilshire Boulevard Los Angeles, CA 90025			EXAMINER NGUYEN, DU Y T V	
			ART UNIT 4136	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/581,819

Applicant(s)

ZAKEL ET AL.

Examiner

DUY T. NGUYEN

Art Unit

4136

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5/14/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/CI/CD)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date 5/14/2007

DETAILED ACTION

Abstract

1. The abstract of the disclosure is objected to because the abstract may not exceed 150 in length. Correction is required. See MPEP § 608.01(b).

Drawing

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

Reference numbers 7 and 50 are on Fig. 4, but not in the specification.

Reference number 5 is on Fig. 5, but not in the specification.

A proposed drawings correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required to reply to the Office action to avoid abandonment of the application. The objection to the drawing will not be held in abeyance.

3. The drawings are objected because:

Regarding Fig. 4: Reference number 7 should be reference number 47 according to the specification page 14, lines 5.

Regarding Fig. 5: Reference numbers 67 and 69 should be re-drawn since they are cited in claim 3 that "the contact metallizations (67) having a larger surface area in comparison with the contact metallization (61)" and a cited in claim 22 that "the absorption layer (69) has an enlarger surface area in comparison with the contact metallizations (61) of the cover unit (59)".

Appropriate correction is required.

Specification

4. The specification is objected because of the following informalities:

Regarding page 14, line 15 of the specification: please replace "40" with "14", because "40" is referred as interior space.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto et al. (US Patent 4,612,083, from hereinafter "Yasumoto") in view of Tanaka et al. (US Patent 5,250,469, from hereinafter "Tanaka").

Regarding claim 1, Yasumoto teaches, as shown in Fig. 1e, col. 5, lines 10-17, col. 6, lines 42-68, col. 7, lines 1-55, and claim 1, a method for alternately contacting two wafer-like component composite arrangements (10, 10') consisting of a plurality of cohesively designed similar components (at least one semiconductor element and a conductor electrically connected together), in particular of a semiconductor wafer with a function component wafer for manufacturing electronic modules on a wafer level, in which the two component composite arrangements (10, 10'), each provided with contact metallizations (metal bumps, 20, 20') on their opposing contact surfaces, are brought into a coverage

position with their contact metallizations (20, 20') to form contact pairs, in which position the contact metallizations (20, 20') to be joined together are pressed against one another.

However, Yasumoto fails to teach the contact metallizations being thereby contacted by exposing the rear of one of the component composite arrangements to laser radiation, whereby the wavelength of the laser radiation is selected as a function of the degree of absorption of the component composite arrangement exposed to laser radiation at the rear, so that transmission of the laser radiation through the component composite arrangement exposed to the laser radiation at the rear is essentially suppressed or absorption of the laser radiation takes place essentially in the contact metallizations of one or both component composite arrangements.

Tanaka teaches, as shown in Figs. 3 & 4, col. 4, lines 14-52 and col. 1, lines 5-15, the contact metallizations (3, 8) being thereby contacted by exposing the rear of the rear of one of the component composite arrangements (12) to laser radiation (irradiation beam) , whereby the wavelength of the laser radiation (irradiation beam) is selected as a function of the degree of absorption of the component composite arrangement exposed to laser radiation (irradiation beam) at the rear, so that transmission (irradiation beam system) of the laser radiation through the component composite arrangement (12) exposed to the laser radiation (irradiation beam) at the rear is essentially suppressed or absorption of the laser radiation (irradiation beam) takes place essentially in the contact metallizations (3, 8) of one or both component composite arrangements (7, 12).

In view of the teaching of Tanaka, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching of Yasumoto with the teaching of Tanaka to achieve the transmission of the laser radiation through the

components composite arrangement exposed to the laser radiation at the rear is essentially suppressed or absorption of the laser radiation takes place essentially in the contact metallizations of one or both component composite arrangements. It is favorable because of the heating method the connected portions locally and concentratedly with the irradiation beam, the chip can be contacted on the substrate without establishing the undesirable thermal stress in neither the circuit substrate nor the chip.

Regarding claims 2 and 3, Yasumoto fails to teach the substrate material of the component composite arrangement that is exposed to laser radiation at the rear is selected so that there is transmission of the laser radiation through the component composite arrangement exposed to the laser radiation at the rear and there is absorption of the laser radiation in the contact metallizations of the component composite arrangement exposed to laser radiation at the rear (*as cited in claim 2*); and in the contact metallizations belonging to the opposing component composite arrangement, these contact metallizations having a larger surface area in comparison with the contact metallizations of the component composite arrangement exposed to laser radiation at the rear (*as cited in claim 3*).

Tanaka teaches, as shown in Figs. 3-4, col. 1, lines 5-15, col. 4, lines 14-52, and col. 5, lines 14-52, the substrate material (transparent layer 5, 12) of the component composite arrangement (12) that is exposed to laser radiation (irradiation beam) at the rear is selected so that there is transmission of the laser radiation (irradiation beam) through the component composite arrangement (12) exposed to the laser radiation at the rear and there is absorption (4) of the laser radiation (irradiation beam) in the contact metallizations (3) of the component composite arrangement (12) exposed to laser radiation (irradiation beam) at the rear (*as cited in claim 2*); and in the contact metallizations (8) belonging to the opposing

component composite arrangement (7), these contact metallizations (8) having a larger surface area in comparison with the contact metallizations (3) of the component composite arrangement (12) exposed to laser radiation at the rear (*as cited in claim 3*).

In view of the teaching of Tanaka, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the transparent layers, absorption layer, and contact metallizations as taught by Tanaka to expose to laser radiation, since it is favorable to heat and melt the metal bumps so that they can be bonded with the pads of the chips by irradiating the portion of the bumps.

Regarding claim 7, Yasumoto/Tanaka fail to specifically teach reference temperature is measured in an intermediate space formed by the distance, the measurement being performed by a transmission device through which the laser radiation passes; however, Tanaka does teaches the heating and melting irradiation beam system that provides the irradiation beam having high thermal energy and properly heats the bumps for contacting the IC chip to a substrate (see col. 4, lines 43-62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to be able to manually or automatically measure the temperature and control the laser system, since it is favorable to avoid any damages to the wafers due to high temperature or temperature differences during the bonding process.

Regarding claim 8, Yasumoto teaches, as shown in Fig. 1f, and abstract, for alignment of the contact metallizations in a coverage position to form the contact pairs (20, 20'), the component composite arrangement (10) opposite the component composite arrangement (10'); and a positioning device (aligned system, not shown but discussed in the specification, col. 6, lines 58-68).

However, Yasumoto fails to teach the use of laser radiation.

Tanaka teaches the use of laser radiation (irradiation beam) (see col. 4, lines 43-62).

In view of the teaching of Tanaka, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use diode laser system in order to perform the thermal contact for the contact metallizations. It is favorable because by using the diode laser at a high energy, the time is reduced during the bonding process.

6. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka and further in view of Nakata et al. (US Patent No. 5,617,441, from hereinafter "Nakata"). The teachings of Yasumoto/Tanaka have been discussed above.

Regarding claim 4, Yasumoto/Tanaka teaches the laser treatment (irradiation beam process) such that all the contact pairs or those combined into group are exposed to the laser radiation for the contacting (see Tanaka reference, Figs. 3-4 as discussed above in claims 2-3); however Yasumoto/Tanaka fail to teach the laser treatment is performed by means of a composite arrangement (18, 42, 47) of a plurality of diode lasers (43) which are activated individually or in groups to emit laser radiation (20)

Nakata teaches, as shown in Fig. 2, a multi beam irradiating light source unit (110) having a plurality of diode lasers (101) which are activated individually or in group to emit laser radiation (see col. 4, lines 54-65, and col. 8, lines 31-44).

In view of the teaching of Nakata, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the laser source unit having a plurality of laser diodes in which the each of the laser diodes can be turned on/off to emit

laser radiation. It is favorable to increase the speed rate by irradiating a plurality of laser beams.

Regarding claim 6, Yasumoto/Tanaka fail to teach the diode laser composite arrangement is designed as a diode laser matrix arrangement (47), whereby the diode lasers (43) are activated in their totality or only to the extent of a partial matrix according to the size of the component composite arrangement (12) exposed to laser radiation (20) at the rear.

Nakata teaches the light source units are arranged in a matrix form, and the diode lasers are activated in their totality or only to the extent of a partial matrix according to the size of the component composite arrangement exposed to laser radiation at the rear (see abstract and col. 8, lines 31-44).

In view of the teaching of Nakata, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the matrix form of the light source unit and the laser diodes as taught by Nakata, since it is favorable to decrease the cost and facilitate the position adjustment and maintenance.

7. Claim 5 is rejected under Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka and further in view of Nakata and Lutz (US Patent 6,762,072). The teachings of Yasumoto/Tanaka have been discussed above.

Regarding claim 5, Yasumoto/Tanaka fail to teach the diode laser composite arrangement is designed as a diode laser linear arrangement which is arranged at a distance below the component composite arrangement which is exposed to laser radiation at the rear, and the diode laser linear arrangement is moved in at least one axis and in parallel to the plane of extent of the component composite arrangement.

Nakata teaches, as shown in Fig. 2, col. 4, lines 54-65, and col. 8, lines 31-44, the diode laser composite arrangement is designed as a diode laser linear arrangement which exposed to laser radiation. The motivation is to increase the speed rate by irradiating a plurality of laser beams.

However, Yasumoto/Tanaka/Nakata fail to teach the diode laser linear arrangement is moved in at least one axis and in parallel to the plane of extent of the component composite arrangement.

Lutz teaches, as shown in Fig. 5, cols. 7-8, the composite arrangement (box 42 provides an x-y stage to move the wafer) is moved in at least on axis and in parallel with the diode laser (layer beam 41).

In view of the teaching of Lutz, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teaching of Lutz into Yasumoto/Tanaka/Nakata so that to place the diode laser at an appropriate distance below or above the composition arrangement and to move the diode laser or the composite arrangement in at least one axis and in a parallel plane, since it is to ensure that the localized laser energy of the laser beam is projected on the entire perimeter of the bond frame.

8. Clams 9, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka and further in view of Lutz. The teachings of Yasumoto/Tanaka have been discussed above.

Regarding claim 9, as referred back to claim 1 discussed above, Yasumoto teaches a positioning device (aligned system) for relative positioning of the component composite

arrangements (10, 10') such that the contact metallizations to be joined together form contact pairs (20, 20') (see col. 6, lines 58-68).

However, Yasumoto/Tanaka fail to teach a device for alternately contacting two wafer-like component composite arrangements consisting of a plurality of cohesively designed identical components, having a receiving frame for supporting and holding the first component composite arrangement on a transparent panel arranged in the receiving frame, having a diode laser composite arrangement arranged inside the receiving frame and separated from the component composite arrangement by the transparent panel, having a holding clamp for receiving the second component composite arrangement such that contact surfaces of the component composite arrangements provided with contact metallizations are arranged opposite one another, having

Lutz teaches, as shown in Figs. 1, 2 and 5, col. 5, lines 14-41, col. 6, lines 28-51, and col. 8, lines 18-33, a device (system) for contacting wafers (11, 14) having a receiving frame (holder) for supporting and holding the wafers (11 and 14, 14 can be a transparent layer or cap), a holding clamp (holder) for clamping the stack wafer, a diode laser composite arrangement (the luminous of laser beam, 17), and having pressure device (under mechanical pressure, shown in Fig. 5) for generating a contact pressure between the wafers (11, 14).

In view of the teaching of Lutz, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the structures of Yasumoto/Takana with the system of Lutz in order to perform the bonding process and structure as similar as in the claimed invention. It is appropriate to combine Yasumo/Takana and Lutz since one having skill in the art can create hermetically sealed devices having rounded channels.

Regarding claim 15, Yasumoto teaches, as shown in Fig. 1f, and abstract, for alignment of the contact metallizations in a coverage position to form the contact pairs (20, 20'), the component composite arrangement (10) opposite the component composite arrangement (10'); and position device (aligned system, not shown but discussed in the specification, see col. 6, lines 58-68).

However, Yasumoto/Lutz fail to teach the use of laser radiation.

Tanaka teaches the use of laser radiation (irradiation beam) (see col. 4, lines 43-62).

In view of the teaching of Tanaka, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use diode laser system in order to perform the thermal contact for the contact metallizations. It is favorable because by using the diode laser at a high energy, the time is reduced during the bonding process.

Regarding claim 16, Yasumoto teach the positioning device (aligned system) is designed to be triaxial (three perpendicular transverse directions) such that in addition to a biaxial positioning of the component composite arrangement (10, 10') in the plane of extent of the component composite arrangement (10, 10'), the positioning device (aligned system) serves to execute an adjusting movement across the plane of extent such that the positioning device serves to create the contact pressure (see col. 6, lines 58-68, and col. 7, lines 1-55).

9. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka/Lutz and further in view of Nakata. The teachings of Yasumoto/Tanaka/Lutz have been discussed above.

Regarding claim 10, Yasumoto/Tanaka/Lutz fail to teach the diode laser composite arrangement is designed as a diode laser linear arrangement having a plurality of diode

lasers arranged in a row which diode lasers are arranged on a diode laser mount that can be moved across the alignment of the row and in parallel to the plane of extent of the component composite arrangement.

Nakata teaches, as shown in Fig. 2, col. 4, lines 54-65, and col. 8, lines 31-44, the diode laser composite arrangement is designed as a diode laser linear arrangement having a plurality of diode laser arrange in a row. The motivation is to increase the speed rate by irradiating a plurality of laser beams.

Yasumoto/Tanaka/Lutz/Nakata fail to specially teach the diode laser are arranged on diode laser mount that can be moved across the alignment of the row and in parallel to the plane of extent of the component composite arrangement; however, Lutz does teach an infrared transmission alignment method and box 40 provides an x-y stage to move the wafer relative to the laser scanner (see col. 5, lines 15-16, col. 7, lines 66-67, and col. 8, lines 1-2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching of Lutz in order to move the diode laser in parallel with the plane of extent of the composite arrangement, because by moving either the diode laser or the component composite arrangement, it can be sure that the localized laser energy of the laser beam is projected on the entire perimeter of the bond frame.

Regarding claims 11 and 12, as discussed in claim 10, Yasumoto/Tanaka/Lutz teach the circular contact surface of the component composite arrangement and the movement of diode laser linear arrangement (Lutz's reference); however, Yasumoto/Tanaka/Lutz fail to teach the diode lasers of the diode laser linear arrangement can be activated individually or in groups in such a way that only the diode lasers of the diode laser linear arrangement which are needed for coverage of the respective transverse extent of the contact surface of

the component composite arrangement as a function of the distance to be traversed can be activated for acting upon a circular contact surface of the component composite arrangement (as cited in claim 11); and the diode laser composite arrangement is designed as a diode laser matrix arrangement having a plurality of diode lasers each arranged in rows and columns (as cited in claim 12);

Nakata teaches, as shown in Figs. 2 and 20, a multi beam irradiating light source unit (110) having a plurality of diode lasers (101) which are activated individually or in group to emit laser radiation (as cited in claim 11) (see col. 4, lines 54-65, and col. 8, lines 31-44); and the diode laser composite arrangement is designed as a diode laser matrix arrangement having a plurality of laser diode each arranged in rows and columns (as cited in claim 12) (see abstract and col. 18, lines 24-30).

In view of the teaching of Nakata, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the laser source unit having a plurality of laser diodes in which the each of the laser diodes can be turned on/off to emit laser radiation and the matrix arrangement as taught by Nakata into Yasumoto/Tanaka/Lutz so that only the diode lasers of the diode laser linear arrangement which are needed for coverage of the respective transverse extent of the contact surface of the component composite arrangement as a function of the distance to be traversed can be activated for acting upon a circular contact surface of the component composite arrangement. It is favorable to increase the speed rate by irradiating a plurality of laser beams and decrease the cost and facilitate the position adjustment and maintenance.

Regarding claim 13, Yasumoto/Tanaka/Lutz fail to teach the diode lasers of the diode laser matrix arrangement can be activated individually or in groups such that with a

coaxial alignment of the surface midpoints of the contact surface of the component composite arrangement and of the matrix surface for acting upon the circular contact surface, the diode lasers can be activated according to the size of the contact surface either in a totality or only to the extent of a partial matrix required for coverage of the contact surface.

Nakata teaches, as shown in Figs. 2 and 20, the diode laser (101) of the diode laser matrix arrangement, and the diode laser can be activated by individually or group (see abstract, col. 4, lines 54-65, and col. 8, lines 31-44, col. 18, lines 24-30).

In view of the teaching of Nakata, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of the diode laser and its operation function as taught by Nakata in order to active the diode laser according to the size of the contact surface either in a totality or only to the extent of a partial matrix required for coverage of the contact surface. As a result, the cost and the time decrease, since the laser radiation can be concentrated on a particular area or whole area of the contact surface.

Regarding claim 14, Yasumoto/Tanaka/Lutz fail to teach a transmission device (19) which serves to measure a reference temperature is provided in an intermediate space formed by a distance between the transparent panel and the diode laser composite arrangement.

Tanaka teaches, as shown in Fig. 3, col. 4, lines 43-62, the irradiation beam system provides a high thermal energy from below (a distance is formed) a transparent coating layer (5). The motivation is to heat and melt the bump so that the bumps can be junctioned promptly with the pads of the IC chip.

Nakata teaches, as shown in Fig.2, the diode laser composite arrangement (see abstract and Fig.1, col. 1, lines 60-65). The motivation is to increase speed rate by irradiating a plurality of laser beams.

In view of the teachings of Tanaka/Nakata, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the diode laser system and arrangement as taught by Tanaka/Nakata to control the high thermal energy provided by the irradiation beam system. For controlling the low and high energy, a measure or sensing device must be applied and/or built in the laser system, since it is known in the art to one when working on a high thermal process, especially in the semiconductor fabrication process. As the result, any damages may occur to the wafers during the thermal process can be avoided.

10. Claims 17, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka and further in view of Lutz and Farnworth et al. (US Patent Pub. 2003/0025188, from hereinafter "Farnworth"). The teachings of Yasumoto/Tanaka have been discussed above.

Regarding claim 17, Yasumoto/Tanaka fail to teach a first transparent component composite arrangement comprised of a plurality of cohesively designed transparent cover elements and a second component composite arrangement comprised of a plurality of cohesively designed sensor units each having at least one sensor each of which is brought into contact with a substrate unit of a sensor unit which is equipped with through-contacts for rear contact access to the sensor unit.

Lutz teaches, as shown in Figs. 1-2, a first transparent composite arrangement comprise a transparent layer (14) and second component composite arrangement (11)

comprised of a plurality of sensor units (sensor structure) each having at least one sensor (12) each of which is brought into contact with substrate unit of a sensor unit (see col. 5, lines 14-40).

In view of the teaching of Lutz, it would have been obvious to one of ordinary skill in the art to employ the teaching of Lutz to form a plurality of cohesively designed transparent elements and a plurality of cohesively designed sensor units, since it is favorable to achieve wafer level packaging of inertial sensors, pressure sensor, and optical MEMS for telecommunications as well as numerous other applications.

However, Yasomoto/Tanaka/Lutz fail to teach a substrate unit of a sensor unit which is equipped with through-contacts for rear contact access to the sensor unit.

Farnworth teaches, as shown in Fig.1A, a substrate unit (12) of a sensor unit which is equipped with through-contacts (38) for rear contact access (54) to the sensor unit (die 14) (see paragraphs 0028, 0037, and 0038).

In view of the teaching of Farnworth, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching of Yasomoto/Tanaka/Lutz with Farnworth to form a substrate unit of a sensor unit which is equipped with through contacts for rear contact access for the sensor unit, because this permits the package to stacked to similar packages to form an electric assembly.

Regarding claim 18, Yasumoto teaches oppositely arranged contact metallizations (20, 20') of the cover unit (10') (see Fig. 1f, col. 7, lines 21-22).

However, Yasumoto/Tanaka fail to teach the sensor unit that are brought into contact with one another having a solder material as contact material.

Lutz teaches the cover unit (14), the sensor unit (12) and bond frame material (13).

In view of the teaching of Lutz, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yasumoto/Tanaka with Lutz, as to form the contact metallizations of the cover units and bring the cover unit and the sensor units into contact with one another via contact material, since it provides a more effective hermetic seal.

Regarding claim 20, Yasumoto/Tanaka fail to teach at least one group of contact metallizations has an absorption layer consisting of a highly absorbent material as the substrate for the contact material.

Lutz teaches the absorption layer (20) having a high absorption coefficient (see Fig. 4, lines 28-51).

In view of the teaching of Lutz, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the structure of Yasumoto/Tanaka with Lutz in order to form an absorption layer on the contact metallizations, since it contains a high absorption coefficient with respect to the wavelength of laser beam, so that the energy of the laser beam may be absorbed.

11. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka/Lutz/Farnworth and further in view of Takezawa et al. (US Patent Pub. 2003/0207073, from hereinafter "Takezawa"). The teachings of Yasumoto/Tanaka/Lutz/Farnworth have been discussed above.

Regarding claim 19, referred back to claim 17 as discussed above, Yasumoto/Tanaka/Lutz/Farnworth fail to teach a conducting adhesive as the contact material.

Takezawa teaches, as shown in Fig. 1, a conducting adhesive as the contact material (see paragraph 0076).

In view of the teaching of Takezawa, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the conducting adhesive as the contacting material as taught by Takezawa, since it is favorable to connect the electrodes formed on the opposite substrates by heating.

12. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka/Lutz/Farnworth and further in view of Burberry et al. (US Patent 5,858,607, from hereinafter "Burberry"). The teachings of Yasumoto/Tanaka/Lutz/Farnworth have been discussed above.

Regarding claim 21, Yasumoto/Tanaka/Lutz/Farnworth fail to teach at least one group of contact metallizations has an absorption layer consisting of a highly absorbent material as the substrate for the contact material.

Burberry teaches an adhesion promoting layers can be interposed between the top layers and the support, or between the top layer and an interposed layer or between the interposed layer and the support (see col. 4, lines 53-67).

In view of the teaching of Burberry, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yasumoto/Tanaka/Lutz/Farnworth' structures with Burberry's teachings in order to form an adhesion promoting layer in between the absorption layer and the contact material. It is appropriate to combine Yasumoto/Tanaka/Lutz/Farnworth and Burberry because one having skill the art can improve the adhesion characteristic between those contact layers.

Regarding claim 22, Yasumoto/Tanaka/Lutz/Farnworth fails to specifically teach the absorption layer of the group of contact metallizations assigned to the sensor units has an enlarged surface area in comparison with the contact metallizations of the cover units; however, Tanaka teaches, as shown in Figs. 3-4, the contact metallizations (8) belonging to the opposing component composite arrangement (7), these contact metallizations (8) having a larger surface area in comparison with the contact metallizations (3) of the component composite arrangement (12) (also discussed in claim 3 above). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the surface area of the absorption layer taught by Lutz and the contact metallizations taught by Yasumoto with the structure taught by Tanaka to achieve an absorption layer has an enlarger surface area in composition with contact metallizations, because it is favorable to heat not only the metal bumps but also the electrode pads.

13. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasumoto as modified by Tanaka/Lutz/Farnworth and further in view of Horning et al. (US Patent Pub. 2004/0180464, from hereinafter "Horning"). The teachings of Yasumoto/Tanaka/Lutz/Farnworth have been discussed above.

Regarding claim 23, Yasumoto/Tanaka/Lutz/Farnworth fail to teach a contact metallization of the cover units surrounding a sensor in a ring is brought into contact with a contact metallization of the respective sensor unit surrounding the sensor in a ring, thereby forming a sealing ring.

Horning teaches, as shown in Fig. 2, paragraph 0027, a sealing ring (56) that completely surrounds the vibrating sensor (60).

In view of the teaching of Horning, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yasumoto/Tanaka/Lutz/Farnworth with Horning as to form a sealing ring around the sensor by the contact metallizations, since it is favorable to form a hermetically sealed cavity.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to application's disclosure: US Patent 5,500,540 to Jewell et al. which discloses a package and method for packaging optoelectronic or electric component.
15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DUY T. NGUYEN whose telephone number is (571) 270-7431. The examiner can normally be reached on Monday-Friday, 7:30 Am - 5:00 Pm (alternative Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lisa M. Caputo can be reached on (571) 272-2388. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service

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/DUY T NGUYEN/

Examiner, Art Unit 4136

/Lisa M. Caputo/

Supervisory Patent Examiner, Art Unit 4136

